

## **Growth mechanism of nanowires: Ternary chalcogenides**

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### **Abstract**

In the past two decades there has been a large rise in the investment and expectations for nanotechnology use. Almost every area of research has projected improvements in sensors, or even a promise for the emergence of some novel device technologies. For these applications major focuses of research are in the areas of nanoparticles and graphene. Although there are some near term applications with nanowires in photodetectors and other low light detectors, there are few papers on the growth mechanism and fabrication of nanowire-based devices. Semiconductor nanowires exhibit very favorable and promising optical properties, including high transparency and a several order of magnitude better photocurrent than thin film and bulk materials. We present here an overview of the mechanism of nanowire growth from the melt, and some preliminary results for the thallium arsenic selenide material system. Thallium arsenic selenide (TAS) is a multifunctional material combining excellent acousto-optical, nonlinear and radiation detection properties. We observed that small units of (TAS) nanocubes arrange and rearrange at moderate melt undercooling to form the building block of a nanowire. In some cases very long wires (>mm) are formed. Since we avoided the catalyst, we observed self-nucleation and uncontrolled growth of wires from different places.